LCC Information and Tools for Conservation Planning and Design in the Northeast Region

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North Atlantic LCC

- 12 states + D.C.
- 4 Canadian provinces
- 15 Tribes
- Multiple partners & partnerships
- Diverse land use
- Predominantly private lands
- Diverse systems/habitats
  - Marine
  - Coastal
  - Riverine
  - Forests
  - Agriculture
  - Mountains
North Atlantic LCC – Mission

...provides a partnership in which the conservation community works together to address increasing land use pressures and widespread resource threats and uncertainties amplified by a rapidly changing climate.
North Atlantic LCC

• Developing and **delivering** scientific information and tools
• For partners to prioritize and guide conservation actions toward common goals
LCC Science Projects

• Nearly 30 completed or ongoing science projects providing foundational data, assessments and decision support for terrestrial, aquatic and coastal systems

• Projects and Products tabs of LCC website
How Projects and Products Fit Together

- These **science projects and their resulting products** fit together and build towards information, tools and capacity needed to make more informed conservation decisions. The projects include those that develop:
  - **foundational information** providing the basis for assessing condition of and threats to priority resources;
  - **assessments** of the condition, major threats and vulnerabilities to these resources; and
  - **decision support tools** including conservation designs that use the foundational information and assessments to help partners prioritize and decide how much of what conservation actions are needed where to sustain these resources

- **Science delivery** projects make information and tools available, understood and used by decision makers and demonstrate their applications.
Regional Information on Data Basin

<table>
<thead>
<tr>
<th>Resource Category</th>
<th># of Datasets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate change</td>
<td>65</td>
</tr>
<tr>
<td>Terrestrial</td>
<td>53</td>
</tr>
<tr>
<td>Aquatic</td>
<td>19</td>
</tr>
<tr>
<td>Coastal and marine</td>
<td>36</td>
</tr>
<tr>
<td>Conservation Design</td>
<td>59</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>232</strong></td>
</tr>
</tbody>
</table>

[Image of data basin website: nalcc.databasin.org]
Multiple Scales of Conservation Planning

- Spatial scales that match the decisions being made
- Ability to have scales inform each other
  - Regional context for watershed, state and local actions
- Plan based on both current and projected future conditions
  - Climate change
  - Urban growth
Regionally Consistent, Scalable Assessments
Resolution

• 30 meter cell resolution
• Works at regional and local scale
• Local knowledge and data can (and should) be added
Assessments of Current and Future Conditions

Landscape Capability Models based on species distributions, habitat associations, and stressors

Climate Suitability Models based on current and projected humid temperate domain

Landscape Capability for Blackburnian Warbler 2010

Blackburnian Warbler Climate Niche (2010)

Blackburnian Warbler Climate Niche (2080)
Key (conservation) Questions to be Answered by Landscape Conservation Information and Tools

- Where should we invest in land protection, and how much?
- How should we manage protected lands?
- Where should we invest in ecological restoration?
- Where should we focus species protection and restoration?
- Where and how should we influence local land use / open space planning?
- Where should infrastructure go to have least impact?
Regional Consistent Habitat Maps - Example

- Terrestrial Habitat Map
  - 130 Ecological Systems
- Aquatic Habitat Map
  - 23 lotic and 18 lentic systems
  - Detailed hydrography
- Updated NWI
- Development and roads
Habitat Assessment: Ecological Integrity

- **Intactness**...freedom from human impairment (anthropogenic stressors)
- **Resiliency**...capacity to recover from or adapt to disturbance and stress

Assessed for each of the ecosystem types in Northeast Terrestrial & Aquatic Habitat Map
“Conserving the (geophysical) Stage” Approach

- Landform Variety
- Elevation Range
- Wetland Density
- Landscape Complexity

Resilience
- Far above average
- Above average
- Slightly above average
- Average
- Slightly below average
- Below average
- Far below average

Geophysical Assessment: Resiliency (TNC)
Integral and Resilient Ecosystems

- Combination of Integrity and Resilience
- Intact areas representing all habitat types likely to be resilient in the short and long term
Representative (Surrogate) Species

• Criteria:
  – Species typify lifecycle or habitat requirements for a larger group of species
  – All major ecosystem (habitat) types represented
  – Sensitivity to landscape change within focal region
  – Feasibility of monitoring & modeling
## 15 Surrogate Species Models for Conn. River watershed

<table>
<thead>
<tr>
<th>Ecosystem/Habitat Types</th>
<th>Initial Set of Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deciduous forest, mature</td>
<td>Wood Thrush</td>
</tr>
<tr>
<td>Deciduous forest, young</td>
<td>American Woodcock, Ruffed Grouse</td>
</tr>
<tr>
<td>Forest, large blocks</td>
<td>Black Bear</td>
</tr>
<tr>
<td>Mixed (coniferous) forest</td>
<td>Moose, Blackburnian Warbler</td>
</tr>
<tr>
<td>Spruce-fir forest</td>
<td>Blackpoll Warbler</td>
</tr>
<tr>
<td>Pine barrens (and young forest)</td>
<td>Prairie Warbler</td>
</tr>
<tr>
<td>Grasslands</td>
<td>Eastern Meadowlark</td>
</tr>
<tr>
<td>Riparian and floodplain forest</td>
<td>Louisiana Waterthrush</td>
</tr>
<tr>
<td>Forested wetlands</td>
<td>Northern Waterthrush, Wood Duck</td>
</tr>
<tr>
<td>Streams (+ associated uplands)</td>
<td>Brook Trout, Wood Turtle</td>
</tr>
<tr>
<td>Marshes</td>
<td>Marsh Wren</td>
</tr>
</tbody>
</table>
Representative Species Habitat Models

- American Black Duck, Non-Breeding
- Habitat and Climate Suitability
Aquatic Species Assessments and Models

Brook trout: headwater streams

Anadromous spp.
- Alewife
- American shad
- Blueback herring
- Shortnose sturgeon
- Atlantic Sturgeon
Decision Support Tool Example
Ches. Bay Brook Trout Assessment

To support the management outcome of the Chesapeake Bay Watershed Agreement:

“Restore and sustain naturally reproducing brook trout populations in Chesapeake headwater streams with an eight percent increase in occupied habitat by 2025.”
Decision Support Tool For Brook Trout
http://www.fishhabitattool.org/

Brook Trout Current Condition

Natural Habitat Quality Index
- Water temperature
- Slope
- Precipitation

Anthropogenic Stress Index
- Impervious surface
- Agriculture
- Mining
Web-Based Decision Support Tool

Visualization Tool
Visualize and access data sets and model outcomes at multiple spatial scales (segment and aggregated to HUC12 and HUC8).

Ranking Tool
Identify restoration and protection priorities at segment, HUC12 and HUC8 scales based on user defined criteria.

Futuring Tool
Simulate effects of user-defined restoration activities.
Assessment developed by TNC depicting top 5% of habitat for river herring (alewife and blueback herring)

Decision Support Tool For River Herring
http://www.fishhabitattool.org/
Assessing Resiliency of Systems and Species to Storms and Sea Level Rise

- **Aquatic** Connectivity and Resiliency of Road Stream Crossings
- Increasing **Beach** Resiliency in the Face of Sea Level Rise and Storms
- Increasing **Tidal Marsh** Resiliency in the Face of Sea Level Rise & Storms
North Atlantic Connectivity Collaborative

Assessing road-stream crossings to improve river and stream continuity across the North Atlantic U.S.

Products/Outcomes

• Regional network of practitioners
• Linking natural resources, transportation, emergency management sectors
• Standard road-stream crossing survey protocol and training
• Regional online database
• Support for targeted crossing assessments
• Tools to prioritize crossings for upgrade based on increasing ecological benefit and resiliency to floods
Habitat Restoration: Where should we focus effort to restore Aquatic Connectivity and Flood Resilience?

North Atlantic Connectivity Collaborative

- Benefit brook trout
- Benefit diad. fish
- Risk of failure
- Impact of failure
- Restoration potential
Riparian Restoration Decision Support Tool

• Online tool works by identifying vulnerable stream and riverbanks that lack tree cover and shade in coldwater stream habitats to focus riparian restoration
Assessing Future Energy Development across the Appalachians

- Models of future development potentials for coal mining, gas drilling, and wind farm creation
- Web-based mapping tool with spatially explicit energy development projections
Conservation Design in the North Atlantic LCC

• A planning process
  – a collaborative effort among partners, which includes agreeing on common priorities

• A set of products
  – spatial plans for conservation decisions in an adaptive framework
Goal 1
Conserve habitat to support healthy fish, wildlife, and plant populations and ecosystem functions in a changing climate.

Strategy 1.1
Identify...an ecologically-connected network of terrestrial, freshwater, coastal, and marine conservation areas that are likely to be resilient to climate change and to support a broad range of fish, wildlife, and plants under changed conditions.

Action 1.1.1
Identify and map high priority areas for conservation using information such as species distributions (current and projected), habitat classification, land cover, and geophysical settings (including areas of rapid change and slow change).
Chesapeake Conservation Partnership Goals

• **Habitats**: Protect a network of large natural areas and corridors sufficient to allow nature to respond to a changing climate and land development and to support thriving populations of native wildlife, migratory birds, fish and plants.
Initial Strategy for Cons. Design

• Facilitate collaborative conservation designs at key scales to both support planning at those scales and apply lessons learned to future efforts
  – Initial landscape scale conservation designs is focused on in large watersheds or other similar scale ecoregions where there are active partnerships working with an initial pilot in the Connecticut River Watershed
  – Initial focus at the regional scale is a collaboration with state fish and wildlife agencies to support the development of Regional Conservation Opportunity Areas (RCOAs) for State Wildlife Action Plan Updates
CONNECTICUT
A roadmap for conserving the Connecticut River watershed for future generations
What are we designing conservation for?

_Inclusive view of biodiversity and natural resources_

• Ecosystems [habitat types]
  – Including the functions they perform and services they provide
    • Ecological Integrity
    • Resiliency (“conserving the stage”)
    • Rare Natural Communities not captured

• Species
  – Species that represent the needs of others (surrogate species)
    – _Priority species not well-represented (e.g., rare) included at local scales_
Integrating Elements

USFWS
UMass
USGS

Surrogate Species

States Nature Serve LCC

Rare Nat. Commun.

UMass

Ecological Integrity and Resilience

Optimization

Core area network

Core Areas

Regional conductance

High

Low
Suggestions for Using the Products: Core Area Network

Strategic starting point for land conservation and stewardship

Compare to priorities identified at other scales to further rank areas for protection.
Combined Conservation Design Elements

(1) Network of priority core areas

(2) Prioritized connections among cores

(3) Restoration and management opportunities

(4) Tiers or gradient of conservation importance outside of core areas

(5) Plus, make individual (input) datasets available
Regional Conservation Opportunity Areas (RCOAs) Version 1.0

RCOAs will identify a connected network of resilient and ecologically intact habitats that will support biodiversity under changing conditions across the Northeast Region.

RCOAs complement state efforts by providing a regional context...which species and habitats depend on my state the most?
Regional Conservation Opportunity Areas

- Regional Conservation Design
- Applying approaches and lessons learned from Conn. River LCD
- Stratified by Watersheds
- First iteration – Version 1.0 - summer 2016
- Review, testing, revisions
Next Steps for Conservation Design in the Northeast Region

- Continue to develop, refine and deliver regional information and tools
- Implement and test CTR and Regional LCD (RCOAs)
- Use regional information and designs as starting point for additional collaborative LCDs within watersheds (Ches. Bay)
- Compare Neighboring LCC Designs
### Summary – Some Potential Contributions of LCC Tools to Chesapeake Bay Management Strategy

*In concert with Bay-specific tools*

<table>
<thead>
<tr>
<th>Management Strategy</th>
<th>North Atlantic LCC Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black duck</td>
<td>Assessment and prioritization of black duck and marsh habitats</td>
</tr>
<tr>
<td>Brook trout</td>
<td>Assessment and prioritization of brook trout habitat</td>
</tr>
<tr>
<td>Fish passage</td>
<td>North Atlantic Aquatic Connectivity Collaborative</td>
</tr>
<tr>
<td>Wetlands</td>
<td>Prioritization of existing wetlands</td>
</tr>
<tr>
<td>Stream health</td>
<td>Index of Ecological Integrity; fish habitat tools; riparian restoration</td>
</tr>
</tbody>
</table>

*Plus* putting it all together with Landscape Conservation Designs
Thanks. For More Information:

- Coordinator: andrew_milliiken@fws.gov

- Appalachian LCC: [http://applcc.org/](http://applcc.org/)
- Coordinator: jean_brennan@fws.gov